

Chapter 7

Personality Traits in the Context of Sensory Preference: A Focus on Sweetness

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Definitions

Agreeableness: Degree toward being considerate, cooperative, and accommodating

Character: A combination of traits that are learned (e.g., responsibility)

Conscientiousness: Degree of self-discipline, persistence, and perfectionism

Disposition: The predominant tendency or pattern

Empathy: Capacity to recognize and share the feelings and emotions of others

Extraversion: Outgoing and highly sociable personality dimension

Harm Avoidance: Anticipatory worry and fear of uncertainty – similar to neuroticism

Impulsiveness: Inclination to act on the spur of the moment without considering long-term implications

Neuroticism: Propensity to experience emotional events negatively; linked with levels of anxiety and stress

Novelty Seeking: Sensation seeking – similar to venturesomeness and impulsivity

Openness: Willingness to explore new and unfamiliar experiences

Personality: An enduring pattern of a person's psychological and behavioral characteristics

Temperament: The collection of unconscious dispositions

Trait: A distinguishing characteristic of someone's personality

Venturesomeness: Thrill-seeking behavior, particularly for high-risk and potentially hazardous situations

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7.1 Introduction

The consumption of food and drink is necessary to maintain life. However, there is widespread variation not only in the amount of food eaten, but also in the types of food consumed; the presence of preferences lies behind the mixed patterns of consumption. Certain tastes may be disliked by the vast majority of the population (e.g., bitter-tasting foods) while others (particularly sweet tasting), may be actively preferred (Mennella et al. 2005). The processes associated with these preferences are complex; multifactorial models have been developed in order to delineate the influences underlying the preferences but these can be broadly defined as *food effects*, that is, the physical and sensory properties of food and *non-food effects*, for example, person-specific reasons.

7.2 Sensory Properties of Food

The food-related effects (the sensory properties of food such as texture, appearance, and taste) have been of prime interest in choice behavior research; intuitively, any food perceived to be unpleasant along these dimensions is unlikely to be consumed. The texture of an edible substance (e.g., its viscosity, crispness, or grittiness) is known to relate directly to food selection in both primates and humans (Araujo and Rolls 2004). Similarly, the color and appearance of food has been demonstrated to interfere with judgments of flavor intensity and is known to influence the pleasantness and acceptability of foods. Children seem to be particularly sensitive to these effects, often refusing to consume a particular food if it *has bits in it* (De Moura 2007) or happens to be *green* (see later section on “Sweet Taste Preference”). However, it is how a food product tastes that has been the main focus of the food-choice research.

7.3 The Basic Tastes

The human tongue has receptors for what have been described as sweet, sour, salty, and bitter tastes. These are classically described as the four basic food tastes, and each have been associated with variable levels of like/dislike among the general population. Umami (savoriness) and fat both have a growing recognition in the literature as basic tastes that have corresponding receptors on the tongue and unique neural responses (Bachmanov and Beauchamp 2007). Other “tastes” such as spiciness are not unique, and what may be (erroneously) perceived as taste (the burning irritation) can then be construed as a pleasant or unpleasant sensation.

7.4 Individual Differences in Taste Preference

The sensation of taste arises from chemical stimulation of specialized cells, taste receptors, which are grouped in small clusters called taste buds. Although located throughout the oral cavity, taste buds are in the highest concentration on the human tongue in structures called papillae (see Fig. 7.1 below).

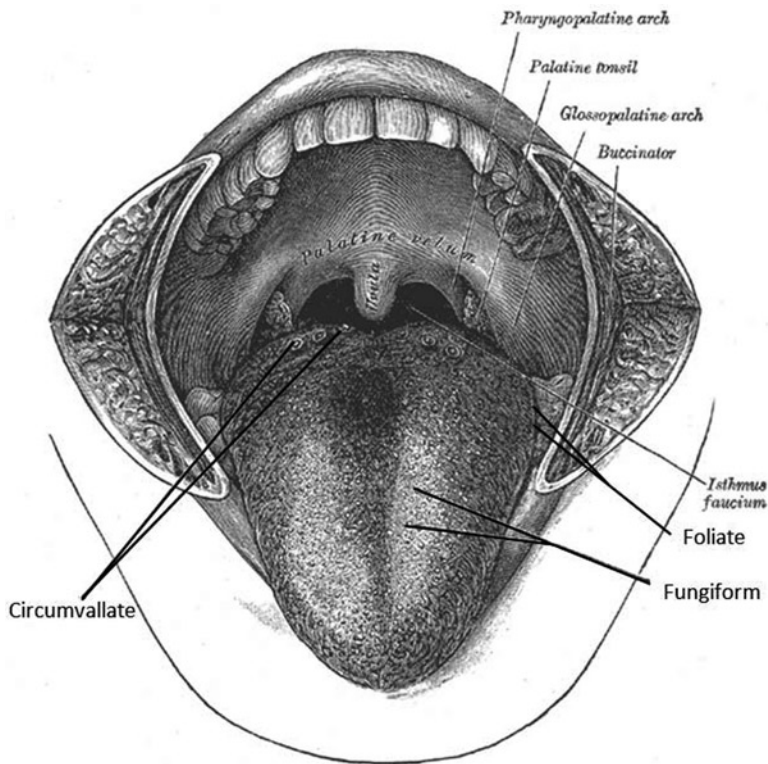


Fig. 7.1 A diagram of the human tongue. The location of the circumvallate, foliate, and fungiform papillae are indicated in bold (Amended from Gray 2000. Reproduced with permission)

Individual differences exist for the exact number present on the tongue and intuitively, taste intensity perception is correlated with the number of papillae present (Miller and Reedy 1990). This biological basis for individual difference in taste preference has thus far been difficult to study; however, with recent advancements in genetic research, it is now becoming clear that genetic differences account for some individual difference in taste preference (Drewnowski et al. 2001). This research thrust is exciting because a genetic basis for preference would transcend cultural boundaries, however it will be several decades before results can be used for any serious applied outcome.

Individual differences could also potentially stem from idiosyncratic likes and dislikes, demographics, psychological, and personality traits. It is entirely plausible that such individual differences could predict taste preferences, however in many published articles these individual differences are often considered “*annoying sources of variance in research...*” and “*referred to as nuisance variables...*” (Stevens 1996 p.303). Obvious differences such as gender and age tend to be included in research, but the less-obvious individual differences, particularly along the psychological dimensions are not. Yet, in other research fields such as health psychology, the opposite pattern is found and individual differences are taught and studied. The emphasis is one of inclusion, and variables such as personality are regarded as potentially important distal determinants of health behavior. They can provide “*useful evidence about the nature of mechanisms underlying sensory phenomena and thus are important in the generation of research hypotheses*” (Stevens 1996, pp. 303).

7.5 Gender Differences

Sex differences have been established in various food-related investigations such as cravings for particular food types, proportion of fruit and vegetables consumed, and avoidance of fats from meat (Goldberg and Strycker 2002). These effects appear to exist as early as primary school (Caine-Bish and Scheule 2009). In relation to sweetness, women do tend to rate sweeter tasting products as more pleasant than men are reported to do (e.g., Laeng 1993); in a study investigating sweet taste preference in obesity, nearly 32% of the female participants rated themselves as having a strong sweet taste preference in comparison to less than 13% of the male participants (Elfhag and Erlanson-Albertsson 2006). However, this apparent gender preference for sweet tasting products does not translate to females consuming greater quantities of sweet snacks (Grogan et al. 1997). This same study reported that women were more ambivalent toward eating sweet snacks than men (perceiving them to be significantly less healthy) and were also more influenced by social pressures than men (Grogan et al. 1997). It is not uncommon for research studies to employ single-sex studies to avoid such entanglements: in a recent study investigating sweet intake, liking, and the urge to eat, in relation to alcohol dependence, the authors decided not to recruit female participants due to the social ambivalence regarding sweet snacks (Krahn et al. 2006). We would recommend against this type of subject selection where it can be avoided, instead, we recommend examining the potential determinants of variation.

Males tend to be less sensitive to bitter and sour tastes than females. Acidity is a natural preservative and is an important ingredient in a range of products; bitterness tends to be minimized but is nevertheless a natural flavor in some foods (e.g., the important antioxidant activity in olive oil is related to polyphenols that elicit a bitter taste). Sweetness may be used to mask certain levels of sour and bitter tastes. It follows that females may seek higher levels of sweetness, firstly because of a natural preference and secondly to mask perceived acidity and bitterness given higher acuity than reported for males.

7.6 Personality

Personality can be described as the relatively enduring pattern of an individual's unique psychological and behavioral characteristics, which can exert some degree of influence over the thoughts and behavior of the individual (e.g., Dworetzky 1999). Different models of personality abound, but those based on trait theory suggest that these dispositions are relatively stable, enabling a high degree of predictability in a person's behavioral repertoire. Secondary traits (or states) tend to be more transient or only appear under certain conditions and can relate to attitudes and preferences. Biological models argue that particular aspects of personality are heritable (see Fig. 7.2) and that these can map onto specific neurotransmitters in the brain with predictable behavioral responses.

One theory of personality that is commonly reported in research is Cloninger's temperament and character model (Table 7.1), based on his work with people who possessed "extreme" personality profiles (Cloninger 1987). Temperament is depicted as a collection of unconscious dispositions that can differentiate people quantitatively. The four constructs of "temperament" include novelty seeking, harm avoidance, reward dependence, and persistence. In contrast, "character" refers to constructs that demonstrate an acquired or learnt component, such as the degree of self-directedness, co-cooperativeness, and self-transcendence (Cloninger 1993, 1994). See Table 7.2 for an explanation of these terms.

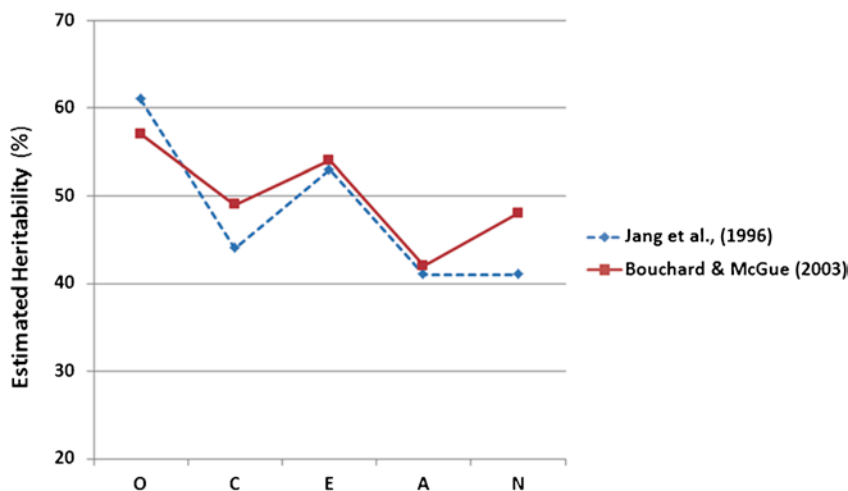


Fig. 7.2 Estimated heritability of personality factors from the Big five questionnaire. Similar data from two independent studies indicate a high degree of consistency in this estimation. Key: *O* openness, *C* conscientiousness, *E* extraversion, *A* agreeableness, *N* neuroticism

7.7 Temperament and Eating Behavior

It is the constellation of temperament qualities that has received most attention in research due to the forging of a direct link between personality and biological mechanisms. Temperament is assumed to have a constitutional or biological basis strongly influenced by heredity. Three strands of Cloninger's theory of temperament have been linked to neurotransmitter functioning in the brain, and are known to modulate eating behavior and the regulation of feeding. Specifically these are: dopamine (novelty seeking), serotonin (harm avoidance), and noradrenalin (reward dependence).

Cloninger posits that high novelty seeking is a proxy measure of dopamine activity within the mesolimbic regions of the brain (Cloninger 1994). Dopamine is a neurotransmitter thought to modulate the rewarding aspects of "motivating" stimuli, particularly during the learning of new likes and dislikes, the seeking out of new and novel experiences. Animal studies indicate that dopamine activity is linked more to the anticipatory desire and motivation (the *wanting*) rather than pleasure derived from consummation (the *liking*) (Robinson et al. 2005). Increases in dopamine activity in the mesolimbic and orbitofrontal regions of the brain have been associated with response to pleasant tastes and these same regions show a higher degree of activity when hungry compared to satiated (Tataranni et al. 1999). As such, dopamine is a primary candidate for involvement in food reinforcement, and by extension, in mediating taste preference.

Low levels of serotonin are typically reported in patients with clinical levels of anxiety and depression. Subscales of harm avoidance include anticipatory worry, fear of uncertainty, and shyness, all of which can be considered prototypical features of clinical anxiety (Cloninger 1993). Those with high levels of harm avoidance may actively avoid novel situations or those that may involve confrontation or punishment. More specifically, raising serotonin levels has been demonstrated to suppress appetite, lower food intake, and lower fat intake (for a review see Lam et al. (in press)).

Classical and operant conditioning are two processes that underpin the ability to learn, essentially the pairing of conditioned stimuli/cues with responses. The acquisition of paired associations is thought to be modulated by noradrenaline. Atypical noradrenaline functioning has

Table 7.1 Key terms of Cloninger's temperament and character theory of personality (Cloninger 1998)

Temperament dimension	Descriptors of extreme variants	
	High	Low
Harm avoidance	Pessimistic	Optimistic
	Fearful	Daring
	Shy	Outgoing
	Fatigable	Energetic
Novelty seeking	Exploratory	Reserved
	Impulsive	Rigid
	Extravagant	Frugal
	Irritable	Stoic
Reward dependence	Sentimental	Critical
	Open	Aloof
	Warm	Detached
	Sympathetic	Independent
	Industrious	Lazy
	Determined	Spoiled
	Ambitious	Underachieving
	Perfectionistic	Pragmatic
Character dimension		
Self-directedness	Responsible	Blaming
	Purposeful	Aimless
	Resourceful	Inept
	Self-accepting	Vain
	Disciplined	Undisciplined
Cooperative	Tenderhearted	Intolerant
	Empathic	Insensitive
	Helpful	Hostile
	Compassionate	Revengeful
	Principled	Opportunistic
Self-transcendent	Self-forgetful	Unimaginative
	Transpersonal	Controlling
	Spiritual	Materialistic
	Enlightened	Possessive
	Idealistic	Practical

been demonstrated in patients with posttraumatic stress disorder, who are overly sensitive to trauma-related cues (for review, see Yehuda 2002). Typically, it is thought of as governing the body's "fight or flight" response in times of acute stress, and on the TCI, its subscales are sentimentality, attachment, and dependence. Low levels of reward dependence are associated with being aloof, withdrawn, and detached; high levels are synonymous with being open, revealing, and dedicated (Cloninger 1993). Drugs that target noradrenaline receptors have been demonstrated to promote weight loss by suppressing appetite and producing early satiety.

7.8 Sweet Taste Preference

Sweetness has been referred to as an innate or naturally preferred taste, even in very young children, while salty, sour, and bitter are acquired tastes that need some perseverance, often extending into late childhood before being liked. Foods that are rated as pleasant and consumed in great quantities by

Table 7.2 Temperament personality constructs indicated with neurotransmitter systems and associated subsequent behavioral response (Amended from Cloninger 1998. The Genetics and Psychobiology of the Seven-Factor Model of Personality pp.68). In Kenneth R. Silk (1998) Biology of Personality Disorders

Temperament construct	Principal neurotransmitter	Relevant stimuli	Behavioral response
Novelty seeking	Dopamine	Novelty CS of reward CS or UCS of relief of monotony or punishment	Exploratory pursuit Appetitive approach Active avoidance, escape
Harm avoidance	Serotonin	Conditioned signals for punishment, novelty, or frustrative nonreward	Passive avoidance, extinction
Reward dependence	Noradrenaline	Reward conditioning (pairing CS and UCS)	Formation of appetitive CS

CS conditioned stimulus, *UCS* unconditioned stimulus

children in most western countries are those with a high sugar and fat content, while vegetables are regarded as universally disliked. This pattern of taste preferences appears to be universal and transcends cultures (Prescott et al. 1992).

Additional evidence for the innate preference of sweet tastes comes from studies involving neonates. A common methodology has been adopted by several studies – neonates are given solutions containing the basic tastants and facial expressions are observed immediately after ingestion (see Fig. 7.3). By observing positive facial expressions, sweet tastes were found to be universally accepted, while sour and bitter tastes were associated with tell-tale facial responses indicating an aversion (e.g., Steiner 1977). Recent research suggests this innate preference for sweet tastes may have a partial genetic basis (Mennella et al. 2005), and this regulates the consumption of sweet foods (Reed et al. 1997). Keskitalo and colleagues (2007) found a relationship between the frequency of consuming sweet foods and a genetic marker on chromosome 16. They had participants rate the pleasantness of various tastants, and reported preference for the extremely sweet solution, reporting an estimated heritability factor of 40% (Keskitalo et al. 2007). However, two caveats to this study are (1) the unequal gender split in favor of women (68% vs. 32%), and (2) the age range of participants (18–78 years). No data was published describing the demographics, but demographic variables were used as covariates in the analysis.

The innate tendency for a sweet preference might confer an adaptive advantage – a sweet taste signals the presence of sugars and thus of immediate high calorific value. In contrast, sour and bitter tastes are perhaps indicative of noxious substances and the decomposition of food and thus best avoided. Infants and older children often appear to be picky with food, particularly if they have not tasted it before. This mild neophobia illustrates the process of children learning what is safe to eat and what is not.

Neophobia has been identified in adults and can predict behavior pertaining to ingestion of novel vs. familiar foods and willingness to eat novel foods (Pliner and Hobden 1992). The authors categorized neophobia as a personality trait, and report that it correlates positively with measures of trait anxiety but negatively with novelty/sensation seeking (Pliner and Hobden 1992). Both of these traits have genetic links, suggesting that neophobia is also heritable. Indeed, one twin study estimated the heritability of neophobia at 67%, though this was only with female participants (Knaapila et al. 2007). This evidence is supportive for the notion that likes and dislikes of specific tastes and foods can be mediated by personality traits.



Fig. 7.3 Neonates displaying variable facial responses to basic tastes (Reproduced from Steiner 1997. With permission). Key: 1 rest, 2 water, 3 sweet, 4 sour, 5 bitter

One early study to investigate personality traits and taste preferences was completed in India by Venkatramaiah and Baby Devaki (1990). They asked 38 female postgraduate students to self-report food preferences via checklist, and measured personality traits with the Indian Personality Inventory (unpublished measure created by the same authors in 1980). The personality traits were derived from the Indian philosophy of Samkhya. They reported main effects for personality and food types, speculating that sweet foods were preferred most by those with high “*tamas*” scores (a trait that maps onto Cloninger’s harm-avoidance trait). However, no post hoc analyses were ran to assess group differences for any tastes.

A recent study investigated the purported influence of trait anxiety on food taste preferences in Japan (Kato et al. 2006) (Fig. 7.4). The authors divided 73 university students into 2 groups according to the trait scores from the State-Trait Anxiety Inventory, and then tested for sensitivity to sweet, salty, and sour tastes. Of prime interest was the finding that the trait-anxiety group had a higher sensitivity to sweet tastes but not salty or sour. Kato and colleagues (2006) posited that people with high trait anxiety experience more stress on a daily basis, and that this was instrumental in causing the change to eating habits. However, the research was based on young university undergraduate students with no breakdown of gender. Given that the study did not employ a longitudinal design and no premorbid dietary measures were taken, it may be speculative to conclude that trait anxiety *caused* any changes to eating habits.

The link between trait anxiety and sweet preference is supported by an earlier study investigating personality and dietary habits (Kikuchi and Watanabe 2000). They tested 470 university undergraduate students who were required to keep daily records of their dietary habits recorded over a 2-year period, designed to capture the frequency and amount of 40 pre-specified food types consumed. Personality was measured using a modified version of the NEO Five Factor Inventory (Costa and McCrae 1992). This provided scores on the “big five” factors of personality: openness, conscientiousness, extraversion, agreeableness, and neuroticism. High scores on each of the five personality factors



Fig. 7.4 A taste preference experiment in progress. This may usually take place in a partially secluded booth, in which the participant is able to make judgments on preferred food or drink tastes by sampling the products; this permits a fine degree of control and manipulation of several variables – in contrast to interview-based research, which relies on participants recollecting taste preferences in the absence of any actual tasting

had characteristic features; of specific interest was the finding that those with high neuroticism had a pronounced sweet taste preference irrespective of gender (Kikuchi and Watanabe 2000).

This finding was supported by Elfhag and Erlanson-Albertsson (2006) in a study of 60 clinically obese patients awaiting treatment at a clinic. Sweet (and fat) taste preference was assessed via structured interviews; on this basis, patients were assigned to one of four groups: strong sweet preference, strong fat preference, strong preference for sweet and fat, and no strong taste preference. Personality was measured with the Swedish University Scales of Personality. The Three Factor Eating Questionnaire was also used to provide measures of cognitive restraint (attempts to limit food intake), disinhibition (difficulties in limiting food intake), and hunger experience (subjective feelings of hunger). The results indicated that those who demonstrated a strong preference for sweet tastes (as opposed to no strong taste preference) showed higher levels of neuroticism; in particular, the neuroticism subscales that were critical for this distinction were lack of assertiveness and embitterment. Sweet taste preference bore no relation to any of the three eating characteristics (Elfhag and Erlanson-Albertsson 2006). The authors suggest these imply low self-confidence and self-esteem, and an externalized locus of control for difficulties. However, one earlier study (Stone and Pangborn 1990) instead found that preference for sweetness was higher in university students with an “outgoing” personality style, a trait that Elfhag and Erlanson-Albertsson conceded was the “*opposite of neuroticism and rather implies being more unconcerned and carefree*” (p. 64). However, the authors commented that the relation between the outgoing trait and liking for sweetness was not straightforward, as participants who did prefer sweeter drinks did not differ on personality measures from those who did not prefer the sweeter drinks (Stone and Pangborn 1990).

Overall, these recent studies all indicate that those with high levels of trait anxiety and neuroticism exhibit a sweet taste preference. It has been proposed that this may be characterized by “comfort eating,” indicative of some reward deficiency syndrome (Wang et al. 2003) or possibly reflective of some “*self-medicating purpose that exceeds basic energy requirements*” (Davis et al. 2004 p. 132). There are indications that the opioid neurotransmitters may be involved in the rating of sweet tastes as pleasant and in reducing observed behavioral measures of stress after eating sweet tasting foods

(Dallman et al. 2003). Dallman and colleagues (2003) proposed that symptoms of chronic stress could be attenuated by the consumption of sucrose (a sweet tasting sugar) by way of dampening sympathetic activity in the hypothalamo–pituitary–adrenal (HPA) axis, a feedback system known to be dysfunctional in anxiety disorders (e.g., Yehuda 2002); it is thought that this is mediated through opioidergic pathways (Dallman et al. 2003).

We recently published a study investigating personality traits associated with a preference for a sweet white wine (Saliba, Wragg and Richardson 2009). Forty-five participants (with a near-equal gender split) were categorized as preferring either a base or sweet taste on the basis of their hedonic response to a dry white wine and another sample with fructose added at 20 g/L. Personality traits were assessed with the big five personality inventory and the Impulsiveness Venturesomeness and Empathy Scale (IVE - Eysenck and Eysenck 1991). We found that the sweet preference group had significantly lower levels of the openness to experiences trait but higher levels of impulsivity (see Fig. 7.5). Openness to experience has been portrayed as a proxy measure of the willingness to explore new and unfamiliar experiences, ideas, and feelings (Costa and McCrae 1992) and may be akin to the novelty-seeking trait in Cloninger's measure of temperament (Cloninger 1993). Previous studies suggest that those with high openness report healthier dietary practices (Goldberg and Strycker 2002). We speculated that infants with a preference for non-sweet taste do not receive sufficient dietary stimulation and so are open to new experiences in order to fulfill this. The finding that sweet taste was preferred by those with high levels of impulsivity is consistent with previous research (Davis et al. 2004).

Animal studies have reported a positive association between preference for sweet solutions and the subsequent intake of alcohol (Sinclair et al. 1992). In a study conducted in patients with alcohol dependency, Kampov-Polevoy and colleagues reported a preference for a solution containing the

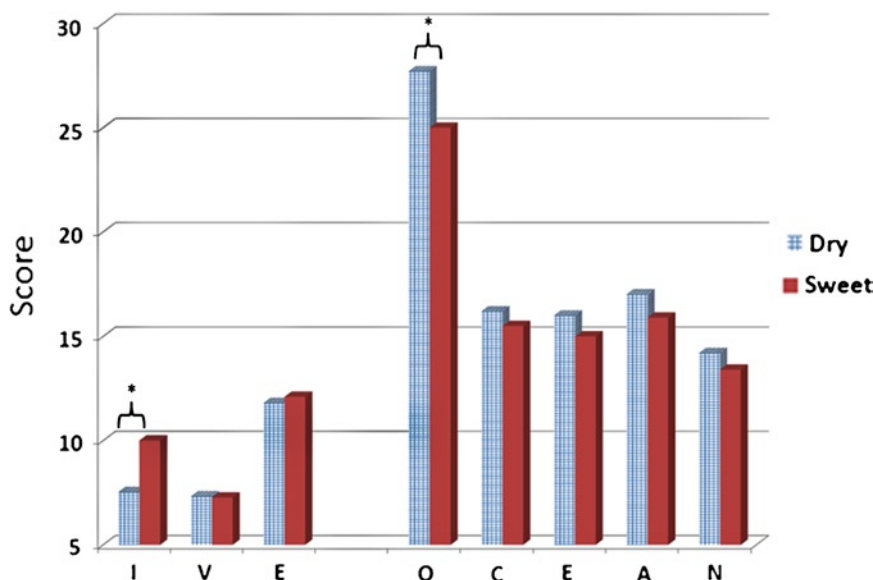


Fig. 7.5 Graph depicting mean average scores of the dry vs. sweet wine taste preference groups on the Impulsiveness, Venturesomeness and Empathy (IVE) and Big five (OCEAN) personality questionnaires (data from Saliba et al. 2009). Note: the scores from the two personality tests are not comparable with each other, and are shown for illustrative purposes only. Key: *denotes significance at $p < 0.05$, $N = 45$

highest sucrose concentration (Kampov-Polevoy et al. 1998). They report that the nonalcoholic group preference for sweet tastes was associated with low novelty seeking, and conversely, sweet-disliking participants had high novelty-seeking scores. In stark contrast, the sweet-liking alcoholics showed high novelty-seeking scores as well as high harm-avoidance scores.

A study by Krahn et al. (2006) reported that alcohol-dependent patients reported a preference for the sweetest tastant during the first month of abstinence. Patients who reported abstinence at 6 months were less likely to prefer the sweetest tastant than those who did not maintain abstinence. The authors suggest sweet preferences could be a marker for future abstinence. Garbutt and colleagues suggest this “sweet-liking/sweet-disliking” phenotype can be considered a marker for cerebral opioid functioning (Garbutt et al. 2009). This hypothesis was tested in alcohol-dependent patients during a 12-week treatment program with naltrexone (an opioid receptor antagonist, which arguably blocks the pleasurable effects of alcohol). Patients were dichotomized into sweet-liking or sweet-disliking groups via a taste test given prior to treatment ($n = 15:25$ respectively), and had their responses and compliance to the naltrexone program recorded. Both groups had similar craving levels prior to treatment and similar retention levels following the study, though the sweet-liking group took longer to achieve the necessary 3-abstinent days prior to onset of treatment and were less likely to achieve two consecutive dry days during treatment. The sweet-disliking group also had significantly more abstinent days throughout. Interestingly, the authors also reported that sweet-liking patients with high cravings had a higher percentage of abstinent days compared to sweet-disliking patients also with high craving. However, Kranzler and colleagues (2001) argued that since children of alcoholic parents are at a greater risk of developing alcohol dependency, then preference for sweet taste must be a phenotypic marker for risk of alcoholism. They found no such pattern, and suggest that the effect published by Kampov-Polevoy and colleagues may be instead due to chronic drinking, as opposed to an underlying genetic predisposition.

7.9 Applications to Other Areas of Health and Disease

The World Health Organization has predicted that by 2015, over 700 million people worldwide will be obese (WHO 2006), a prevalence rate of almost 10%. Research investigating the factors associated with poor dietary lifestyle has been ongoing, such as knowledge of the effects of consuming too much food. Research suggests that although 95% of US adults believe that balance, variety, and moderation are the keys to healthy eating (Lachance 1992) and 83% are aware that what they eat can affect their future health, there is a discrepancy between dietary knowledge and actual intake (Shepherd and Stockley 1987). The fact that nutritional knowledge alone may be insufficient to promote changes in eating behavior suggests that psychological factors may be paramount in setting the stage for dietary change. The underlying drivers of consumption, particularly related to personality and taste preferences, are a current focus. Our own work (Saliba et al. 2009) showing a link between personality and taste preference highlights the need for a whole of modeling approach, one that takes into account underlying taste preference, personality type, as well as other variables such as food attitudes and cultural norms.

Of particular concern is the fact that high impulsivity (specifically, sensitivity to reward) has been linked to overeating (Davis, Strachan and Berkson 2004) and along with food preferences strongly predict an individual's body mass index (Davis et al. 2007). An individual who presents high in impulsivity and also has taste preferences that predispose them to overeating is at particular risk. Impulsivity has been linked to sweet taste preference (Saliba et al. 2009) and obesity (Fassino et al. 2002), although recent evidence has questioned whether sweet taste preference actually leads to

higher levels of obesity (Hayes and Duffy 2008). The same research suggests that fat preference may be more predictive of obesity, albeit along with sweet preference (Hayes and Duffy 2008); future research needs to determine the link between personality type, fat taste preference, and subsequent obesity levels.

Summary Points

- Individual taste preferences cause a widespread variation not only in the amount of food eaten, but also in the types of food consumed.
- Individual differences in the concentration of taste buds on the tongue affect taste acuity, which influences taste preferences. This research is exciting because a biological basis for preference would transcend cultural boundaries; however applied outcomes may be some decades away.
- It is entirely plausible that individual differences could predict taste preferences; however in many published articles these individual differences are often not examined. Yet in other research fields such as health psychology the opposite pattern is found and individual differences are taught and studied; variables such as personality are regarded as potentially important distal determinants of health behaviors.
- Women tend to rate sweeter tasting products as more pleasant, whereas males are more tolerant of higher levels of sourness. Although gender differences exist in the types of foods consumed, this does not appear to translate to clearly poorer dietary choices by either gender.
- Different models of personality abound, but those based on trait theory suggest that dispositions are relatively stable, enabling a high degree of predictability in a person's behavioral repertoire. Secondary traits (or states) tend to be more transient or only appear under certain conditions and can relate to attitudes and preferences.
- Sweetness has been referred to as an innate or naturally preferred taste, even in very young children, while salty, sour, and bitter are acquired tastes that need some perseverance, often extending into late childhood before being liked.
- Individuals with high levels of trait anxiety and neuroticism exhibit a sweet taste preference. This may be characterized as "comfort eating."
- Impulsivity is a personality dimension known to be associated with overuse syndromes. Individuals with a sweet taste preference report higher on impulsivity, which may be a concern if future research shows that overeating is linked to sweet taste preference.
- Preference for fatty tastes may be the strongest of all taste preferences in predicting obesity. Further research needs to establish the link between personality and fat taste preference.

References

- Bachmanov AA, Beauchamp GK. *Annu Rev Nutr.* 2007;27:389–414.
- Caine-Bish NL, Scheule B. *J Sch Hea.* 2009;79:532–40.
- Cloninger R. *Arch Gen Psychiatry.* 1987;44:573–88.
- Cloninger R. *Curr Opin Neurobiol.* 1994;4:266–73.
- Cloninger CR, Svrakic DM, Przybeck TR. *Arch Gen Psychiatry.* 1993;50:977–91.
- Cloninger R. In: Silk KR (Ed) *Biology of Personality Disorders*. American Psychiatric Press, Inc; 1998.
- Costa PT, McCrae RR. *NEO PI-R professional manual*. Odessa, FL: PAR Inc.; 1992.
- Dallman MF, Akana SF, Laugero KD, Gomez F, Manalo S, et al. *Physiol Behav.* 2003;79:3–12.
- Davis C, Strachan S, Berkson M. *Appetite.* 2004;42:131–8.
- Davis C, Patte K, Levitan RD, Reid C, Tweed S, Curtis C. *Appetite.* 2007;48:12–9.

- de Araujo IE, Rolls ET. *J Neurosci*. 2004;24:3086–93.
- de Moura SL. *Appetite*. 2007;49:716–9.
- Drewnowski A, Henderson SA, Barratt-Fornell A. *Drug Metab Disp*. 2001;29:535–8.
- Elfthag K, Erlanson-Albertsson C. *Physiol Behav*. 2006;88:61–6.
- Eysenck HJ, Eysenck S. *Adult impulsiveness venturesomeness and empathy scale*. London: Hodder & Stoughton; 1991.
- Fassino S, Leombruni P, Piero A, Daga GA, Amianto F, Rovera G. *Compr Psychiatry*. 2002;43:431–7.
- Garbutt JC, Osborne M, Gallop R, Barkenbus J, Grace K, et al. *Alc Alcsm*. 2009;44:293–300.
- Goldberg LR, Strycker LA. *Personal Individ Differ*. 2002;32:49–65.
- Gray H (2000) *Anatomy of the Human Body*. Philadelphia: Lea & Febiger, 1918; www.bartleby.com/107/ [January 2010].
- Grogan SC, Bell R, Conner M. *Appetite*. 1997;28:19–31.
- Hayes JE, Duffy VB. *Physiol Behav*. 2008;95:77–87.
- Kampov-Polevoy AB, Garbutt JC, Davis CE, Janowsky DS. *Alcohol Clin Exp Res*. 1998;22:610–4.
- Kato M, Ito Y, Naga S, Shimizu J. *J Int Study Diet Hab*. 2006;17:44–8. Google Translation.
- Keskitalo K, Knaapila A, Kallela M, Palotie A, Wessman M, et al. *Am J Clin Nutr*. 2007;86:55–63.
- Kikuchi Y, Watanabe S. *J Epidemiol*. 2000;10:191–8.
- Knaapila A, Tuorila H, Silventoinen K, Keskitalo K, Kallela M, et al. *Physiol Behav*. 2007;91:573–8.
- Krahn D, Grossman J, Henk H, Mussey M, Crosby R, Gosnell B. *Addict Behav*. 2006;31:622–31.
- Kranzler HR, Sandstrom KA, Van Kirk J. *Am J Psychiatry*. 2001;158:813–5.
- Lachance PA. In: Finley JW, Robinson SF, Armstrong DJ, editors. *Food safety assessment (ACS symposium series 484)* (pp. 278–296). Washington, DC: American Chemical Society; 1992.
- Laeng B, Berridge KC, Butter CM. *Appetite*. 1993; 21:247–254.
- Mennella JA, Johnson A, Beauchamp GK. *Chem Senses*. 1995;20:207–10.
- Mennella JA, Yanina Pepino M, Reed DR. *Pediatrics*. 2005;115:216–22.
- Miller IJ, Reedy FE. *Physiol Behav*. 1990;47:1213–9.
- Pliner P, Hobden K. *Appetite*. 1992;19:105–20.
- Prescott J, Laing D, Bell G, Yoshida M, Gillmore R, et al. *Chem Senses*. 1992;17:801–9.
- Reed DR, Bachmanov AA, Beauchamp GK, Tordoff MG, Price RA. *Behav Genet*. 1997;27:373–87.
- Robinson S, Sandstorm SM, Denenberg VH, Palmiter RD. *Behav Neurosci*. 2005;119:5–15.
- Saliba AJ, Wragg K, Richardson P. *Food Qual Pref*. 2009;20:572–5.
- Shepherd R, Stockley L. *J Am Diet Assoc*. 1987;87:615–9.
- Sinclair JD, Kampov-Polevoy AB, Stewart R, Li TK. *Alcohol*. 1992;9:155–60.
- Steiner JE. In: Weiffenbach JM, editor. *Taste and development: the genesis of sweet preference*. Washington DC: US Government Printing Office; 1977.
- Steiner JE. *Pure Appl Chem*. 1997;69:721–7.
- Stevens DA. *Food Chem*. 1996;56:303–11.
- Stone LJ, Pangborn RM. *Appetite*. 1990;15:63–79.
- Tataranni PA, Gautier JF, Chen K, Uecker A, Bandy D, et al. *PNAS*. 1999;96:4569–74.
- The World Health Report (WHO). *Working together for health*. 2006.
- Venkatramaiah SR, Baby Devaki P. *J Pers Clin Study*. 1990;6:1–5.
- Wang GJ, Volkow ND, Thanos PK, Fowler JS. *Psych Annals*. 2003;33:104–11.
- Wise RA. *Phil Trans R Soc: Biol Sci*. 2006;361:1149–58.
- Yehuda R. *N Engl J Med*. 2002;346:108–14.